REMARKS

The foregoing amendment amends claim 1 and cancels claim 12. The amendment to claim 1 is described throughout the specification. *See e.g.*, page 69, lines 12 – page 70, lines 12. No new matter has been added.

The Cited References Do Not Describe the Claimed Capacitance

The Examiner rejected claims 1, 4, 5 and 7 under 35 U.S.C. 103(a) alleging that the claims are unpatentable over JP Publication 2003-098205 to Mitsuru *et al.* (Mitsuru) in view of U.S. Patent No. 6,496,013 to Buks (Buks), rejected claims 2 and 3 under 35 U.S.C. 103(a) as being unpatentable over Mitsuru in view of Buks and further in view of U.S. Patent No. 5,789,846 to Brown, and rejected claim 12 under 35 U.S.C. 103(a) as being unpatentable over U.S. patent 6,624,644 to Ito *et al* in view of U.S. Pub. 2004/0227942 to Law. Claim 12 has been cancelled so the rejection of claim 12 is moot. The rejections of the remaining claims are traversed for the reasons set forth below.

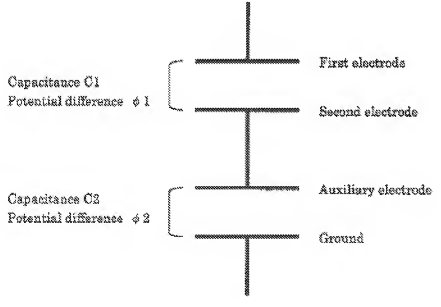
Claim 1 defines an electric field sensor, comprising, *inter alia*:

> a first electrode that is provided close to said electro optic crystal, and that applies the electric field based on the signal under test to said electro optic crystal;
>
> a second electrode that is provided close to said electro optic crystal, thereby forming a pair with said first electrode; and
>
> an auxiliary electrode that is electrically connected to said second electrode,
>
> wherein a first capacitance between said auxiliary electrode and a ground is larger than a second capacitance between said first electrode and said second electrode, the first capacitance and the second capacitance being arranged in series.

The specification describes that the electric field sensor includes an EO crystal (electro optic crystal) 7, a signal electrode 11, a counter electrode 12 and an auxiliary electrode 61. *See e.g.* Figs. 33 and 34; page 69, lines 12-21. The specification further describes the relationships of these elements as follows:

> When φ denotes a potential difference between the signal electrode 11 and the ground, C1 denotes electrostatic capacitance of the capacitor C1, C2denotes electrostatic capacitance of the capacitor C2, φ1 denotes a potential difference between the electrodes of the capacitor C1, and φ2 denotes a potential difference between the electrodes of the capacitor C2, the following two expressions are established:
>
> φ1 = φ C2/(C1+C2)
> φ2 = φ C1/(C1+C2)

Page 69, line 22-page 70, line 12. As shown in Figs. 33 and 34 and discussed above, C1 denotes the capacitance between the signal electrode 11 and ground and C2 denotes the capacitance between the auxiliary electrode 61 and ground. The expressions shown above reflect that the capacitance C1 and the capacitance C2 are arranged in series. The figure below illustrates the series arrangement of the capacitance C1 and the capacitance C2, where the signal electrode is identified as the first electrode and the counter electrode is identified as the second electrode.



The amplitude of the electric field within the EO crystal 7 is proportional to the potential difference φ1. To increase the amplitude of the electric field within the EO crystal 7 (that is, increase the sensitivity of the electric field sensor), the electric field sensor is designed to satisfy a relationship of the capacitance C2>C1 (and preferably C2>>C1) when the capacitance C1 and the capacitance C2 are arranged in series. This means that a first capacitance between the auxiliary electrode and the ground is larger than a second capacitance between the first electrode and the second electrode when the first capacitance and the second capacitance are arranged in series. *See* page 69 line 12 - page 70 line 12 and FIGS. 33, 34.

In rejecting claim 1, the examiner admitted that Mitsuru fails to disclose that the capacitance between the auxiliary electrode and ground is larger than a capacitance between the first electrode and the second electrode. However, the examiner alleged that Buks describes this element.

Buks describes an additional capacitance between a first electrode and a circuit ground in parallel with a capacitance to be measured in order to measure a current going to the circuit ground. The additional capacitance is usually larger than the capacitance to be measured as to reduce the variation of electric charge accumulated in the capacitance to be measured. *See* col. 1, lines 43-53. Buks does not disclose that the additional capacitance and the capacitance to be measured are arranged in series. Thus, Buks does not describe the claimed first and second capacitance, where the first capacitance is between an auxiliary electrode and a ground and the second capacitance is between the first electrode and second electrode, and the first and second capacitances are arranged in series.

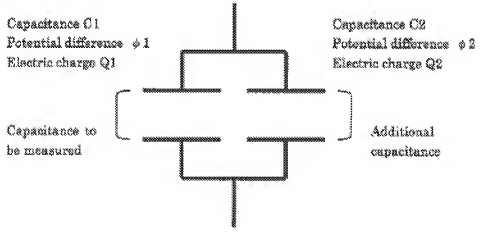
The arrangement of the capacitors described in Buks establishes a different relationship between the potential difference associated with the additional capacitance and the potential difference associated with the capacitance to be measured than that described in the specification and discussed above. The differences will be illustrated using terminology similar to that used in the preceding paragraphs. If φ denotes a potential difference between

the first electrode and the circuit ground, C1 denotes the capacitance to be measured, C2 denotes the additional capacitance, φ1 denotes a potential difference of the capacitance to be measured, φ2 denotes a potential difference of the additional capacitance, Q1 denotes an electric charge accumulated in the capacitance to be measured, and Q2 denotes an electric charge accumulated in the additional capacitance, then the following two expressions are established:

$$\varphi = \varphi 1 = \varphi 2$$

$$Q1/C1 = Q2/C2$$

There are differences between these expressions and the expressions described in the specification because the capacitance to be measured and the additional capacitance described by Buks are arranged in parallel, instead of in series. The figure below illustrates the arrangement described by Buks.



In order to reduce the variation of the electric charge accumulated in the capacitance to be measured, Buks is designed to satisfy a relationship where C2 (additional capacitance) >C1 (capacitance to be measured) and preferably, C2»C1, where the capacitance to be measured and the additional capacitance are arranged parallel to each other. Even if the additional capacitance is larger than the capacitance to be measured according to the teaching

of Buks, the potential difference φ1 does not increase because the capacitance to be measured and the additional capacitance are arranged in parallel. Thus, the parallel arrangement of the capacitances described by Buks does not provide the same result as the series arrangement of the capacitances required by claim 1.

As demonstrated above, Mitsuru and Buks, do not, either alone or in combination, describe each and every element of claim 1. It is respectfully requested that the rejection under 35 U.S.C. 103 (a) of claim 1 be withdrawn.

Claims 2-7 depend from claim 1 and are patentable for at least the same reasons as claim 1.

CONCLUSION

In light of the foregoing, it is submitted that the claims are patentable over the cited references and that the claims are in condition for allowance. No fees are believed due, other than the fee for a Request for Continued Examination. However, the Commissioner is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account 11-0855. If there are any issues that can be addressed via telephone, the Examiner is asked to contact the undersigned at (404) 815-6500.

Respectfully submitted,

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